Chapter I

THE AGE OF DISCOVERY AND SETTLEMENT

EXPLORATIONS

Early in the sixteenth century, only a few decades after Columbus accidentally discovered America, European navigators began sailing into the Atlantic coastal waters of the future United States. In March and April 1513 the Spanish adventurer Juan Ponce de Leon, searching for a fabled spring that restored youth and vigor to the old and impotent, and with an eye also peeled for gold, sailed from Puerto Rico, threaded his way through the Bahama Islands, and landed near Daytona Beach in the land that he named Florida. Hugging the shore to avoid the northward-flowing Gulf Stream, he coasted down the length of the peninsula, rounded the Florida Keys, and sailed up the Gulf Coast as far as Charlotte Harbor.

Giovanni da Verrazano, the first recorded navigator to voyage along the coast of the United States from the Carolinas to Maine, was on a very different mission. A Florentine mariner sailing for Francis I of France in the spring and summer of 1524, Verrazano was seeking a water route through an unwanted continent to the riches of Cathay. The Americas were an annoying obstacle in Europe's course westward to the East, and when it became clear that no passage existed through South or Central America, European logic and desire imperatively insisted that a strait to the Pacific Ocean--the Northwest Passage--must somewhere cut across North America. Looking across what he thought was a narrow isthmus, apparently the barrier sandspits that separate Pamlico Sound from the Atlantic, Verrazano believed that the Pacific Ocean was only a few miles distant. Somehow, probably prudently avoiding shoal water and sailing far out to sea, he missed the great Chesapeake and Delaware bays. He entered New York Harbor, but evidently deciding that the Hudson River was not the strait, hastily departed when unfavorable winds blew up. Putting into Narragansett Bay, he stayed for a fortnight in the sheltered harbor of Newport, Rhode Island. The treacherous shoals eastward of Nantucket and Cape Cod were so much to his disliking that he called them "Armellini," after Francesco Cardinal Armellino, a prelate hated for his avarice and success in collecting papal taxes. Stretching across Massachusetts Bay, he hit the coast of Maine at or near Casco Bay and continued northeasterly past Nova Scotia and Cape Breton Island to Newfoundland, whence he returned to France. He failed to find the strait to the Orient, but by describing the long East Coast of the United States and Canada he influenced North American cartography--not always beneficially-- for over a century.

Verrazano had many followers on the same errand. Every inlet, estuary, bay, or river mouth on the Atlantic coast might be the route to the Indies, either through the Northwest Passage or by way of another illusory but durable entity, the Western Sea. Fashioned by hopeful imagination from Indian stories of inland waters, amazingly extensible and migratory on contemporary maps, yet held to be a certainty by the beginning of the seventeenth century, the Western Sea became an indispensable link connecting rivers flowing into the Atlantic with rivers leading to the Pacific.

Verrazano's failure to report a strait south of Nova Scotia directed exploratory navigations largely northward. John Cabot, a Genoese under patent from Henry VII of England, had already probed there a quarter of a century before Verrazano, but had left little to geographic knowledge beyond uncertainties. Believing that the Far East could best be reached by sailing westward in the short high latitudes, Cabot, in 1497, had gained the coast of America at Cape Breton, Newfoundland, or Labrador--scholars debate just where--and returned home convinced that he had visited an outlying region of China. He tried again the next year, and disappeared. After Verrazano's voyage, Jacques Cartier, Martin Frobisher, Humphrey Gilbert, John Davis, George Waymouth, Henry Hudson, Samuel de Champlain, and many other mariners about whom less is known explored northern waters from Baffin Bay to the Gulf of St. Lawrence, all seeking the passage that had to be there.

Not everyone thought that the passage must lie to the north, and hard behind Verrazano into our own waters came three navigators pursuing the same dream. Estevan Gomez and Lucas Vasquez de Ayllon were sailing for the King of Spain, and John Rut was out to discover the strait for England. Gomez, putting out from Spain only two months after Verrazano had returned to France, was directed "*to search whether amongst the multitudes of windings and vast diversities of our ocean any passage can be found leading to him who we commonly call the Grand Khan."[3] He raised land at or near Cape Breton in February 1525, sailed up the Penobscot River to the head of navigation at the site of Bangor, hoping it was the passage, and coasted on to Massachusetts. Among the numerous capes and inlets that he sighted, scholars have identified Pemaquid Point and Boothbay, the Kennebec and Merrimack rivers, Ipswich Bay, and Cape Ann and Cape Cod. The rest of his voyage is less clear, but he may have continued down the coast to Florida. Ayl1on, armed with a patent from the king to explore some 2,500 miles of coast, to follow any oceanic strait that he might find, and to establish a colony, headed north along the coast from the Spanish colony of Santo Domingo at the same time that Gomez was sailing southward.

He commanded a small armada of five ships carrying 500 men, women, and children, and 80 to 90 horses; but the results of his venture mocked his ambitions. He entered a river, which remains unidentified, where his flagship ran aground and became a total loss. Forty to 50 leagues up the coast he found another river, evidently the Cape Fear, where he planted his colony. Here everything went wrong, Ayllon died of fever, and only 150 survivors made it back to Santo Domingo. John Rut, who also was out "to discover the land of the Great Khan," sailed from England in 1527 along the northern latitudes. But having no relish for the ice-filled seas he found, Rut cast about to the south and ranged along the coasts of Cape Breton, Nova Scotia, and New England, frequently landing men to report on "the state of those unknown regions." Most likely he continued down the coast, but the record is blank until he turned up in the West Indies.[4]

Late in the sixteenth century and early in the seventeenth century, the exploration of American waters was heightened by new incentives. Hopes for finding the Northwest Passage still remained strong, but now European courtiers and merchants were also interested in the fisheries, furs, and other resources of North America, and in establishing settlements there. Mariners in their employ penetrated coastal inlets and sailed far up many rivers from Cape Hatteras to northern Maine.

Simon Ferdinand and John Walker, sent by Sir Humphrey Gilbert in 1579 and 1580 to find a suitable site for a colony, examined Penobscot Bay and possibly also Narragansett Bay. In 1584 and 1585 Ferdinand, Philip Amadas, Arthur Barlowe, and Sir Richard Grenville, on similar assignments for Sir Walter Raleigh that resulted in the ill-fated Roanoke colony, found inlets through the Carolina Banks (the long series of narrow islands that Verrazano had assumed to be an isthmus between two oceans), nosed about in Pamlico and Albemarle sounds, and ascended several of the rivers that flowed into them.[5] In 1602 Bartholomew Gosnold explored for English merchants the coast of New England from southern Maine to Buzzards Bay. To him we owe the names Cape Cod, Martha's Vineyard, and the Elizabeth Islands. He temporarily established a small trading post on Cuttyhunk Island to barter with Indians and, apparently only incidentally, kept an eye open for "finding a passage . . . to the South Sea and China."[6] The next year Martin Pring, on a purely trading expedition, followed the same course as Gosnold, but entered several waterways that Gosnold had overshot, including Massachusetts and Cape Cod bays. For some five weeks Pring made a summer trading camp at a deep and protected anchorage that for many years was identified as Plymouth Harbor but is now thought to be Provincetown Bay. In 1605 George Waymouth, who three years before had searched Canadian waters for the Northwest Passage,

sailed along the coast of Maine to find a colonial refuge for English papists and fishing grounds for his merchant backers. He discovered Monhegan Island, put into an excellent anchorage that he named St. George's Harbor, as it is sti11 called today, and sailed up the broad St. George River estuary.[7]

The year before Waymouth sailed into Maine waters, Samuel de Champlain had taken the first of three voyages between 1604 and 1606 on which he systematically explored and charted the coast from Cape Breton Island to southern Massachusetts. While searching for a favorable site for a French colony, he was always on the lookout-for "a passage which should lead near to the great lake . . . where the water is salt: [a boon] as well for the navigation of ships . . . as for the shortening of the way more than three hundred leagues." The great lake was Lake Huron, which from Indian reports Champlain came to believe could "be nothing else than the South Sea. "[8] In the course of his three voyages Champlain navigated the Penobscot River and the lower reaches of the Kennebec River. He entered Eastport, Machias, Gloucester, Boston, Plymouth, Barnstable, Nauset, and Chatham harbors and sailed through Vineyard Sound as far as Woods Hole. Like many later mariners, he grounded on a reef off Cohasset or Brant Rock and experienced difficulties among the shoals around Monomoy Island. He sighted Portsmouth Harbor and stopped at the mouth of Saco River, but sailing across Casco Bay he missed[9] the fine harbor of Portland, as had other explorers before him. Champlain's report of his voyages was the only fruit of his New England venture. Sieur de Monts, who sponsored the colonial project, lost the king's support, no French settlement was made, and the history of New England became quite different from what it might have been.

Chesapeake Bay, with its many inlets and feeding rivers, was like deeply indented New England a magnet for European navigators. From 1560 the Spanish had an interest in the bay as a site for a naval base to protect their treasure galleons from pirates and privateers as they sailed from Havana northeasterly with the Gulf Stream along the North American coast before turning eastward for home. As this would be an expensive undertaking, however, nothing was immediately done. The first known English ship into the bay was a vessel of the first Roanoke expedition of 1584 piloted by Simon Ferdinand, who claimed to have been there previously with Spanish mariners. The next year the colonists of Roanoke worked their way in a small boat around Cape Henry and explored the southern shore of the bay, Hampton Roads, and the lower estuary of York River. Now that the English had a position on the American coast, the alarmed Spanish, intent on destroying it and replacing it with a Spanish settlement, sent Vicente Gonzalez in 1588 to make a

reconnaissance. But not knowing the colony's location, Gonzalez sailed past the small inlets through the Banks leading to Roanoke Island and took his ship into Chesapeake Bay. There he searched up the western shore and down the eastern, and departed without finding a trace of the English.[10]

After that, exploration and settlement in the great bay was left solely to the English, for the defeat of Spain's great Armada in 1588 destroyed Spanish power to contest it. Christopher Newport, who transported the first colonists to Jamestown, on instructions from King James worked his way up the James River to the falls at present Richmond. More importantly, Captain John Smith, who assumed leadership of the colony, spent much of his first two years at Jamestown exploring the bays and estuaries of the neighboring coast. Smith was under orders from the Virginia Company to find a way to the Pacific and was determined in any event to test Indian statements regarding such a passage. In 1607 he went up the James and the tributary Chickahominy River, looking for a lake at its source--the lake that Englishmen at home continued to believe lay just beyond the Blue Ridge Mountains and fed rivers flowing to the Pacific. The next year he poked into numerous bays and creeks in Chesapeake Bay, searching for good harbors and sites for settlement as well as for the passage. He went up the Potomac, Patapsco, Sassafras, Patuxent, and Rappahannock rivers, but the route to the "big sea water" that supposedly lay somewhere to the northeast of Chesapeake Bay always eluded him.[11]

The Captain, still having hope, sent to his friend Henry Hudson maps that indicated a passage to the western ocean might be found north of the Virginia colony, somewhere about the 40th latitude. Hudson, after having failed twice in the employ of the English Muscovy Company to find a Northeast passage to China through the arctic seas north of Europe, had entered the service of the Dutch East India Company, which assigned him to try once again. Before leaving Holland in 1609, he received Smith's letter, which inclined him to disobey instructions and look to the west. Therefore, failing again to pass Novaya Zemlya, the long barrier island north of Russia, he doubled back to North America. He coasted south to Chesapeake Bay, then reversing his course and examining the coast more carefully, discovered Delaware Bay, but could find no deep and open channel. Working past the confusing sand dunes and keys off the New Jersey shore, he entered New York Harbor, close to the 40th latitude, early in September, probably the first white man to do so since Verrazzano almost a century before. The low screen made by the shores of Long Island, Staten Island, and Sandy Hook had hidden well the only river of the Atlantic coast that provided an entry into the interior at all comparable to that of the St. Lawrence. Hudson

was able to navigate his vessel up the river that bears his name for 150 miles before he had to use small boats to explore farther.[12]

The Hudson River was not the passage to the Orient, but rather to the richest fur country south of the St. Lawrence. Hudson's employers were not interested in the fur trade, but other Dutchmen were. They returned to the river the next year to pursue the exceedingly lucrative trade, and within a few years expanded their operations. In 1614 Adriaen Block navigated the treacherous Hell Gate, pushed eastward through Long Island Sound, visited Narragansett Bay, rounded Cape Cod, and sailed into Massachusetts Bay. In the course of this exploration he discovered another long north-and-south river. Crossing the awkward bar at the mouth of the Connecticut River in Long Island Sound, he sailed upstream for 50 miles nearly to present Hartford. Later the Dutch set up a depot there to tap the fur supply of the long, rich valley. Meanwhile Cornelis Jacobsen Mey sailed south to chart Delaware Bay, bestowing his names, Cornelis and Mey, on the Delaware capes. In 1616 Captain Cornelis Hendrickson sailed up the Delaware River as far north as the Schuylkill, and in this region, too, the Dutch set up trading posts and established a settlement.[13]

In the same year, 1614, that Block and Mey were exploring southern New England and Delaware Bay, Captain John Smith spent 11 weeks working southward from Penobscot Bay to Cape Cod, carefully investigating the shores and waterways of the region, which to him owes its name, New England. By this time several navigators had made their way along the New England coast, but Smith was the first to put into many of its harbors, and his meticulous record of physical features was of enormous value to later mariners. In his Description of New England, a remarkably accurate depiction published in 1616, he comments that he had "sounded about 25 excellent good Harbours: in many whereof there is anchorage for 500 sayle of ships of any burden; in some of them for 5000. *'[14] On his return to England he presented Prince Charles with a map that for accuracy of detail and clarity of presentation far surpassed the charts made by Champlain and other navigators. Speaking of it, Smith explains:

> I have drawn a Map from Point to Point, Ile to Ile, and Harbour to Harbour, with the Soundings, Sands, Rocks and Land-marks as I passed close aboard the Shore in a little Boat; although there be many things to be observed which the haste of other affairs did cause me omit. For set in in being sent more to get present commodities than knowledge by discoveries for any future good, I had not power to search as I would; yet it will serve to direct any that should goe that waies, to safe Harbours and the Salvages habitations.[15]

THE LINES OF SETTLEMENT

The search for the Northwest Passage never shortened passage to the East, but it added vastly to European knowledge of North American geography and helped open the way for colonization. American waterways now took on a more vital purpose. No longer merely imagined avenues to riches beyond, they became the essential highways for the new settlements. The Atlantic coast is a "drowned'* coast, its land and rivers having been submerged by the prehistoric sinking of the continent's edge. This produced an indented coastline with innumerable bays and estuaries, into each of which flows one or more rivers providing access for varying distances to the interior. Majestic rivers like the Hudson, the Delaware, the Potomac, and the Savannah, and many smaller streams such as the Piscataqua, the Charles, the Patapsco, and the Cooper, linked the coastal plain with seaports and through them with Europe. At a time when travel and transportation by waters was easier and more economical than by land, and often the only means of communication in the new colonies, the rivers and their tributaries largely determined the lines of settlement and the course of trade.

In early Virginia, farms and plantations lined the James, York, Rappahannock, and Potomac rivers up to the fall line. Almost every farmer kept a boat on a nearby creek or river, and the larger plantations had wharves for handling their own tobacco at points which seagoing vessels of the day could reach. The first settlers of Maryland established themselves on the St. Mary's River, a small tributary of the lower Potomac, where supplies could be brought in from neighboring Virginia and from New England. From there the colony developed up the north bank of the Potomac and around the great water road of Chesapeake Bay. William Penn instructed his colonists to select on the western side of the Delaware River a spot "most navigable, high, dry and healthy, . . . where most ships may best ride, of deepest draught of water, if possible to load and unload at the bank . . . without boating."[16] On the site chosen, where the Schuylkill joins the Delaware, the city of Philadelphia was laid out. The smaller nearby colonies of Delaware and New Jersey grew from settlements hugging close to Delaware River and Bay and to the east shore of the lower Hudson.

New Netherland, later New York, owed its beginnings to the Hudson passage to Iroquois fur country. The colony's Dutch promoters, hoping to add permanence to their trading-post enterprises, encouraged immigration, and thinly scattered settlements developed along the river to Albany. South Carolina grew from a nucleus at Charleston, which had a good harbor at the point where, as South Carolinians later boasted, "the Ashley and Cooper rivers join to form the Atlantic Ocean.'* North Carolina settle-

ments grew up on the Cape Fear River and on Albemarle and Pamlico sounds. Georgia, founded on the southern border of English America as a military barrier against the Spanish in Florida, began as a fortified town at the mouth of the Savannah River. The Spanish, to protect their treasure fleets from French and English marauders, had founded St. Augustine on Florida's Atlantic coast in 1566. Few settlers, however, came to the colony, and Florida during three centuries of Spanish rule remained little more than a military outpost of Mexico and Cuba.

New England's heavily indented coastline encouraged more scattered early settlement than elsewhere. Within a decade after the Pilgrims of the Mayflower fronted their colony on a good harbor within the shelter of Plymouth Bay, a dozen or more fishing and trading posts dotted the New England coast at inlets from Penobscot Bay to Massachusetts Bay. The Pilgrims established posts on the Penobscot River, on the Kennebec River at the site of modern Augusta, and, shortly after the Dutch opened their post at Hartford on the Connecticut River in 1633, set up another at nearby Windsor. The Massachusetts Bay colony started with the founding of Boston at an excellent harbor and the establishment at the same time of six or seven other towns close by on good water connections. The other New England colonies similarly had their beginnings in groups of towns dispersed on rivers and bays. Rhode Island developed from the communities of Providence, Portsmouth, Newport, and Warwick, which ring Narragansett Bay. Connecticut was formed by the amalgamation of the Connecticut River settlements of Hartford, Windsor, and Wethersfield with New Haven, Branford, Guilford, Stamford, and a half-dozen other port towns on Long Island Sound. New Hampshire got its start with Portsmouth on the Piscataqua River, Dover and Exeter on tributaries of the Piscataqua, and Hampton on the Hampton River, ten miles to the south. Maine originated from Kittery, York, Wells, Saco, New Harbor, and other isolated towns strung along its coast from the Piscataqua River to Pemaquid Point.[17]

THE COURSE OF TRADE

During the colonial era settlement extended up the river valleys as far as the fall line, and there generally stopped. Some outlying communities existed above the line, and a few hardy souls penetrated into and even beyond the Appalachian Mountain chain stretching from Maine to Georgia, but not until after the Revolution was population movement very strong beyond the reach of navigable waterways. Throughout the whole period land travel remained both difficult and costly and roads appallingly bad. It was not until 1722, a century after New England was settled, that a team was driven for the first time from Connecticut to Rhode Island. And as late as 1818 the Niles

Weekly Register reported that two-thirds of the market crops of the Piedmont were raised within 5 miles of some river and the remainder not more than 10 miles from water that could be rendered navigable. The value of the rivers was easy to appreciate: in New York, where-the Hudson was the highway, the average cost of carrying a bushel of wheat 100 miles was only two pence, whereas the cost was a shilling, or six times as much, in Pennsylvania, where 40 wagons, 160 horses, and 80 men were required to transport the same amount of freight handled by two or three men on a scow in New York.[18]

Waterways connected the colonies with the world and with each other. Down the rivers and from the ports went the tobacco of Virginia, Maryland, and North Carolina; the rice and indigo of South Carolina; the grain, flour, cattle, and meats of the middle colonies; the fish, saltmeats, lumber products, ground vegetables, livestock, and simple manufactures of New England; and the furs, hides, ship timber, and naval stores of New England, New York, Pennsylvania, the Carolinas, and Georgia. Into the waterways and up to the towns and farms came tools, hardware, utensils, luxury articles, and other commodities from England and the continent; sugar, rum, molasses, diewoods, ginger, and other exotic products from the islands of West Indies; and fruits and wines from Spain, Portugal, the Mediterranean, and the Wine Islands. A busy coastal traffic also developed, through which the products of each region were exchanged. In New England and the middle colonies the water connections along the coast were also integral links in overseas commerce. Boston, New York, and Philadelphia each served as an entrepot to which small vessels carried the products of the surrounding area for export in ocean-going ships and from which foreign goods were transported by the coasters to the dozens of smaller ports in each trading network.[19]

THE ATLANTIC HARBORS

The colonial settlements had the good fortune to be abundantly provided with natural harbors having the rare combination of considerable shelter and sufficient depth of water. Unlike many foreign ports, where extensive and expensive breakwaters or moles were required for protection against the violence of ocean waves and storms, early American ports could develop on sheltered estuaries and bays. Some ports, like Baltimore, Philadelphia, Norfolk, and Savannah, lay from 30 to 152 miles inland from the sea. Others, like Portland, Boston, and New York, opened more directly on the ocean, but were nevertheless relatively well protected by natural breakwaters of islands and headlands.

Although nature cut some East Coast harbors deeper than others, and at the entrances to many of them had the annoying habit of forming bars from river silt or from shifting shore sands, their depths were generally adequate to the demands of the time. Vessels throughout the colonial period and for more than a half-century after were of diminutive size compared to the cargo carriers of today. Much of the coastal trade between Atlantic ports was carried by shallow-draft sloops and schooners that could enter harbors with shoal entrances. The sloops, rigged fore-and-aft with a single mast, were often under 25 tons and rarely more than 100. Sometimes they were equipped with centerboards instead of fixed keels, which could be drawn up when traversing shoal waters. Schooners, rigged fore-and-aft like sloops but with two masts, usually ranged in size from 50 to 150 tons. Originating in Gloucester, Massachusetts, in 1713 or 1714, the schooner was destined to stand for a century and a half as the favorite and distinctive rig of American waters. It was peculiarly adapted to the requirements of New World navigation, where on many rivers and estuaries the wind tended to draw up or down the channel, and passage involved a great amount of beating to the windward in short tacks. For such service the fore-and-aft rigged schooner, which could sail closer to the wind, was superior to square-rigged vessels of similar size.

While schooners, and even large sloops, were employed in off-shore trade, square-rigged brigs and ships were more common on the longer sea voyages. The two-roasted brigs usually displaced from 150 to 250 tons, and the three-roasted ships seldom more than 300. A vessel over 200 tons was considered large, and a 400-ton ship was looked upon both in Europe and the colonies as being too large for successful operation. Small vessels best met the needs of the highly dispersed trade that prevailed both here and abroad before railroads, good highways, or developed canals and river works could concentrate export shipments in a few major ports. Because each port and waterway was the focal point of its own small hinterland, and there was comparatively little concentration of export shipments prior to loading, cargoes were loaded and discharged in many places. Small vessels could enter and easily maneuver in the several hundred small ports on the Atlantic coast and the many small ports of foreign countries. They could quickly find sufficient cargo and depart, whereas larger vessels might have to wait for some time or sail with partly filled holds. Moreover, as trade was dispersed, spasmodic, and speculative, and all merchant ships were tramps with no fixed routes or schedules, merchant shipowners preferred to spread their risks by employing two or three small vessels rather than a single large one.

With full-rigged ships seldom exceeding 300 tons, and with shipmasters content to wait for 5- to 9-foot tides to carry them over harbor entrance bars, the numerous Atlantic harbors generally had sufficient depth of water just as the colonists found them. Newburyport at the mouth of the Merrimack River, and Salem on Massachusetts Bay, with mean low-water depths diminishing to 7 or 8 feet, became maritime metropolises and leading shipbuilding centers turning out large full-rigged ships as well as smaller craft. Charleston, with some 12 feet at low water and 17 feet at high, and Savannah, with a channel 7 feet deep at low water and about double that at high tide, became the major ports of the South. Even a place like Kennebunkport in Maine, a small hamlet located on an exceedingly small river, with water at low tide as little as 4 feet in places, could develop into a thriving mercantile port building everything from sloops to full-rigged ships.[21]

Some harbor improvement was no doubt attempted in the colonial period, but evidence is sketchy. In three studies of the port of New York, for example, the only references to colonial port improvement, except for the construction of commercial facilities such as docks, wharves, and weighthouses, are the brief comments of one study that in 1662 the Dutch built a small breakwater to protect ships against floating ice from the Hudson, and that when the English took over the colony their improvements included the construction of bulkheads along the waterfront.[22] Dredging appears to have been performed for the first time in America in 1729 at the mouth of the Mississippi River, but evidence indicates that probably the only attempt made on the East Coast during the colonial period was in 1774, when Philadelphians employed a horse-powered grab dredge to clear out ship slips. Dredging was not likely to be tried much in any event, for prior to the application of steam power to dredging equipment, doing the job by man or animal power was slow, laborious, and at best minimally effective.

Whatever the harbor depth, the channel had to be found and followed. Local authorities as a matter of course adopted the age-old device of marking channels with buoys, and at some major harbors pilots were necessary for all vessels except the smaller coasters. Portland Harbor, with a straight, deep channel and a run of only 3.5 miles from open sea to docks, was easy to enter. Norfolk, though 30 miles from the sea, had the same advantage of a deep and clear entrance. Boston Harbor, 17 miles from the ocean, had sufficiently deep water, but its channel threaded through rocky islands hazardous to the mariner in darkness, storm, or fog. The entrance to New York Harbor appeared to the uninitiated to be a 6-mile breadth of good water between Sandy Hook and Coney Island, but a broad sandbar stretched between the two shores, and the main ship channel was only a few hundred

yards wide. Small craft could use three lesser channels, but close to each lay dangerous sandbanks. Philadelphia, just over 100 miles from the sea, Baltimore, 152 miles, and Savannah, 30 miles, all had long winding channel approaches that invited grounding. 24 Illustrative of the measures taken was the action of the colonial assembly of New York in 1763 empowering the governor to appoint one master and three or more wardens for the port of New York. Their duties included examining and commissioning all pilots, keeping buoys in repair, and maintaining lighthouses. At Boston Harbor, piloting was one of the functions of its early lighthouse keepers, who were also the collectors of impost fees.[25]

The lighthouse was another ancient aid to navigation that the colonists began to employ to a limited extent. The first American lighthouse was Boston Light, located on Great Brewster Island (then called Beacon Island) at the entrance to the harbor, which was kindled on 14 September 1716. The enterprise was set in motion by Boston merchants led by one John George, who petitioned the General Court for this protection to the '*Lives and Estates of His Majesty's subjects." The cone-shaped tower was made of rough-cut stone and was at first illuminated by tallow candles. These were later replaced by lamps burning whale or fish oil. New York's lighthouse resulted from a lottery organized in 1762 to raise the money for a tower 85 feet high at Sandy Hook. Newspapers described it as the best light on the continent, an easy boast as at the time only three others existed. Local authorities administered lighthouses until 1789 when the Treasury Department of the federal government assumed control of the 12 stations then operating along the seaboard. Eight were located on the busy but troublesome waters of New England. The northernmost lay at Portsmouth, New Hampshire; five warned of Massachusetts coastal dangers at Newburyport, Cape Ann, Boston, Gurnet at the entrance to Plymouth Bay, and Great Point on Nantucket Island; and two blinked out from New England's southern coast at New Haven, Connecticut, and at Beaver Tail at the entrance to Narragansett Bay. The four lights to the south were at Sandy Hook; Brant Point, New Jersey; Cape Henlopen at the mouth of Delaware Bay; and Charleston, South Carolina.[26]

THE COASTAL RIVERS

Rivers during the colonial period, like harbors, generally provided satisfactory navigation in their natural condition. Most major rivers were not seriously obstructed below the fall line, and the head of sloop navigation was often a considerable distance inland. The Hudson was a splendidly navigable waterway for some 150 miles above New York to Troy. The head of tidewater and sloop navigation on the Delaware was at Trenton, about 140 miles from the sea. In Virginia the three great river ports of

Alexandria, Fredericksburg, and Richmond developed on the Potomac, Rappahannock, and James rivers, each approximately 100 miles from Chesapeake Bay. Even on New England's comparatively shorter streams, vessels could sail 30 miles up the Penobscot to Bangor, 45 miles up the Kennebec to Augusta, and 52 miles up the Connecticut to Hartford. Smaller but important rivers up and down the coast permitted sloop navigation at different tide stages a dozen or more miles inland to busy commercial towns such as Haverhill, Massachusetts, on the Merrimack; Norwich, Connecticut, on the Thames; and New Brunswick, New Jersey, on the Raritan. Many streams that today are little more than winding brooks were also once commercial arteries of some significance. Observers in the nineteenth century noticed a diminution in the size of rivers compared to that in the eighteenth, a phenomenon possibly resulting from deforestation. Bound Creek in New Jersey, for example, now only a brook between Elizabeth and Newark, once had wharves and landings for the accommodation of sloops . And the town of Exeter, New Hampshire, on a small branch of the Piscataqua River now used only by small recreational craft, was in the seventeenth and eighteenth centuries a shipbuilding community ranking in importance with Portsmouth.[27]

Above the head of sloop navigation, flatboats, skiffs, bateaux, wherries, and other shallow-draft vessels plied the rivers. The Durham boat, developed on the Delaware River to fill the need for a sizable carrier that could go against the current, was a favorite craft on many streams. Box-like, with straight and parallel sides extending to about 12 feet from the ends where they curved to the stem and stern posts, the Durham boat was usually about 60 feet long, 8 feet wide, and 42 inches deep from gunwale to keel plank. It drew from 3 to 5-1/2 inches of water when light, and about 28 inches loaded, and could easily carry 150 barrels of flour or 600 bushels of corn. Going downstream it floated with the current, helped along at times by long oars or by a sail attached to a removable mast. The sail was sometimes used going upstream, but more often the boat was poled. The crew, using 12- to 18-foot poles shod with iron, set the pointed tip in the riverbed and, pushing as they went, walked back the length of the boat on planks about a foot wide, called ‘*walking boards,” laid on the thwarts on each side. Sometimes it was possible to draw the boat along by grasping overhanging branches, or “pulling the brush” as it was called, At particularly difficult rapids iron rings were attached to rocks and the boat was pulled upstream by boathooks or ropes.

Local authorities occasionally improved river navigation. Adjoining towns on the lower Connecticut River sometimes deepened the channel lying between them, as did Hartford and Wethersfield in 1686. From time to time the legislature of colonial Virginia authorized associations of gentlemen to raise

subscriptions for clearing rivers of logs, sandbanks, or other obstructions. In South Carolina the assembly assumed occasional responsibility on sections of streams by appointing commissioners authorized to make assessments of labor and money on local residents who would benefit from improvements. In 1770 citizens of Pennsylvania and New Jersey, wanting to make commercial travel on the Delaware above Philadelphia less hazardous, appointed commissioners to remove obstructions in the river and generally improve navigation. Collecting subscriptions to cover the expense, the commissioners surveyed the river between Trenton and Easton and hired men and boats to remove the worst of the rocks. At Trenton Falls, where the river dropped ten feet in a distance of about 1,200 yards, the channel was changed and buoys were placed to mark it. The next year the legislatures of Pennsylvania and New Jersey sanctioned these efforts by declaring the Delaware a common highway and by empowering the commissioners to continue; but, as before, individual donations provided the necessary funds. In 1773 a group of New Jersey residents took it upon themselves to organize a lottery to raise 3,000 pounds to clear and deepen the channel of Elizabeth-Town Creek so that boats might be brought to a landing in the center of town.[29] River improvement in the colonial period, however, like harbor improvement, was obviously not a very extensive practice.